

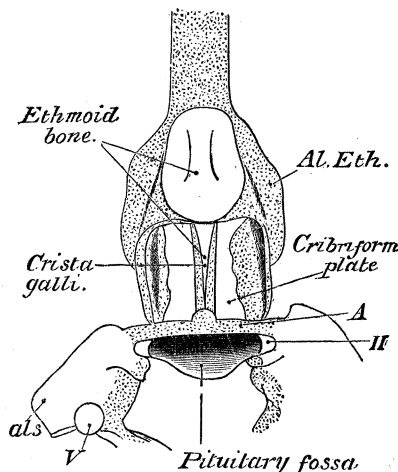
II. "Preliminary Note on the Development of the Skeleton of the Apteryx." By T. J. PARKER, B.Sc., Professor of Biology in the University of Otago.* Communicated by W. K. PARKER, F.R.S. Received February 9, 1888.

[Note by W. K. P.—This is not the first, but it is the most important, of the "Notes" sent to me by my son, on the development of this, the *lowest and most Reptilian* of all birds known. *Seven* stages before hatching have been obtained, and will yield, I am satisfied, most instructive results and, added to what has already been done in the other forms of the Ratitæ, will give something like completeness to our knowledge of the morphology of these archaic types. It is not merely as low kinds of birds that the Struthious types are so important to the biologist; they are so intimately related to the more primitive forms, both of Reptiles and Mammals, that any new fact as to their structure is of great value. This short paper is accompanied by one of my own, purposely to throw light upon its meaning and bearing.]

Extracts from a Description of the Skull of Apteryx at about Period of Hatching.

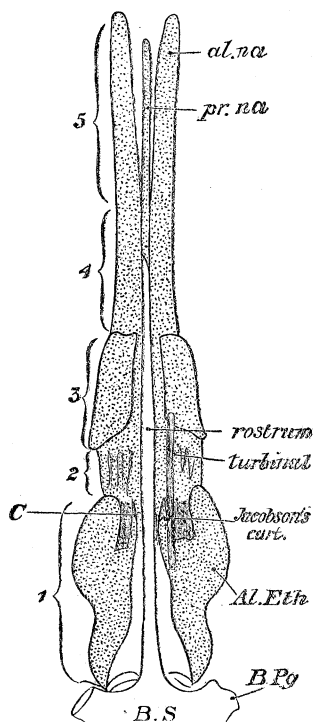
Each alisphenoid is connected by a rod of cartilage (A) with the postero-dorsal angle of the mesethmoid; a *transverse cartilaginous bar* is thus produced, which forms the anterior boundary of the pituitary fossa and the dorsal boundary of the optic foramen.

FIG. 1.



* The Note here given is on the skull only, but I have already received notices of things found in the rest of the skeleton of the apteryx that are only second in importance to those upon the skull.—W. K. PARKER.

FIG. 2.



Ventral View.

The united olfactory capsules consist of (a) the mesethmoid, passing in front into the pre-nasal cartilage; (b) the *lateral ethmoidal plates*; and (c) the turbinals.

The mesethmoid forms in its posterior half a vertical plate, with a thickened lower rim; its posterior border is vertical, and forms the front boundary of the pituitary fossa; the posterior portion of its dorsal border (*cr. gall.*) is concave, from before backwards, and has exactly the relations of the crista galli of a Mammal. Passing forwards from the crista galli, the mesethmoid reaches the surface of the skull, where, with the adjacent portions of the lateral ethmoids, it forms a lozenge-shaped area between the posterior ends of the nasals. Cephalad of this it gradually narrows in the vertical direction, finally becoming in the anterior portion of the beak a mere rod, the pre-nasal cartilage or basi-trabecular. *There is now no trace of the parietal fenestra mentioned by W. K. Parker on the authority of Blanchard ("Ostrich Skull," p. 173).*

In the lateral ethmoidal plates of this bird no clear distinction

can be drawn between ali-ethmoidal, ali-septal, and ali-nasal, any more than between mesethmoid, septum nasi, and pre-nasal. The dorsal border of the mesethmoid, from anterior end of crista galli to within about 2 cm. of end of beak, sends off horizontal plates on each side, which pass at first outwards, then downwards, and finally, in part of their extent, inwards, thus forming roof, outer wall, and in part floor of the nasal chambers.

The precise relation of these lateral ethmoidal plates varies in different regions, and it is convenient to consider them as consisting of five portions.

In the first or posterior portion, besides passing outwards and downwards, they take a sweep backwards, and then inwards, thus forming an almost complete somewhat shell-like covering for the principal or inter-orbital portion of the olfactory capsules. *To this portion the name ali-ethmoid may be applied.* Each ali-ethmoid is a thin plate of cartilage, convex externally, forming the outer border of the *cribriform space* (olfactory foramen) by its dorsal free edge, and closely applied below by its ventral edge to the mesethmoid, immediately dorsad of the rostrum; in front it is continuous laterally and dorsally with the second portion, and ventrally ends irregularly, presenting a deep anterior emargination, which separates a slender, forwardly directed process (*c*) from the main ali-ethmoidal cartilage.

In its second portion the lateral ethmoidal cartilage furnishes only roof and sides to the nasal chamber, the floor being absent, and thus the turbinals are visible from below.

In its third portion it again turns inwards so as to furnish a floor to the nasal cavity, in the form of a plate with a straight lower border abutting against the mesethmoid, and with oblique anterior and posterior edges.

In their fourth portion the lateral ethmoids again furnish only roof and outer walls to the off-chamber, and in their fifth or anterior portion, they are entirely unconnected with the mesethmoid (pre-nasal), and form two slightly divergent obliquely placed plates of cartilage which are continued to the end of the beak, passing dorsad of the nostrils. To these the name ali-nasals might be applied, but owing to the unique position of the anterior nares, the relations of these and other parts of the ethmoidal region is strikingly different from what we are familiar with in other birds.

There is a single ethmoidal ossification, mesethmoid, in the form of a bone composed of horizontal and vertical portions and T-shaped in transverse section. The horizontal portion is shield-shaped, and appears on the surface of the skull between the posterior ends of the nasals: the vertical portion ossifies the whole postero-dorsal region of the mesethmoid: the bone in question is therefore partly mes- and partly ecto-ethmoidal.

FIG. 3.

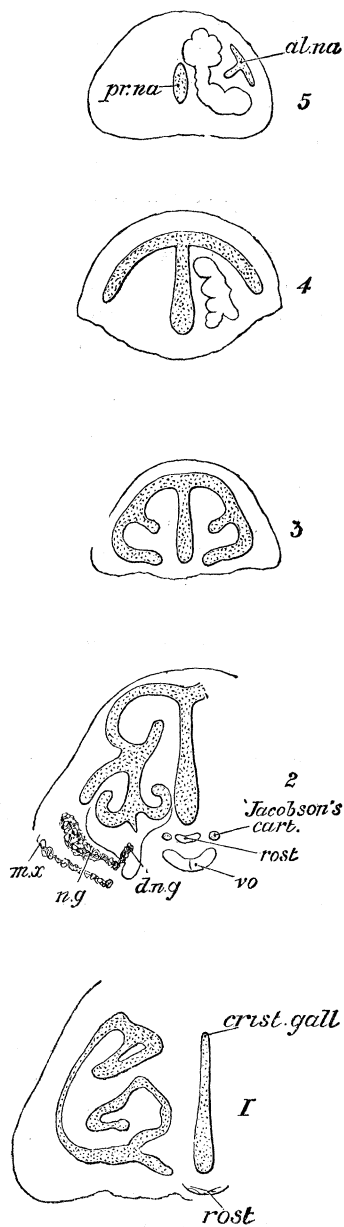
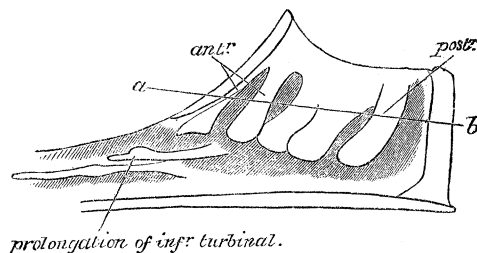
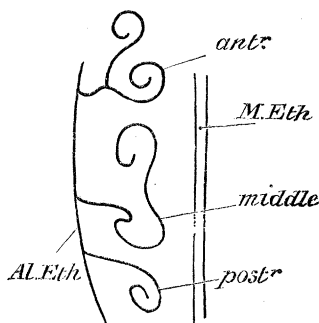


FIG. 4.



Mesial surface of turbinals.

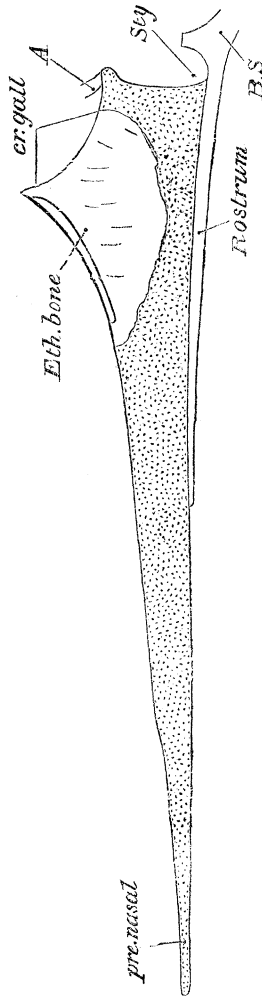
FIG. 5.

Horizontal section along *a*, *b*.

The turbinals consist of in-growths of the ali-ethmoid into the nasal cavity, and are altogether three in number. They may be called respectively anterior, middle, and posterior turbinals. The posterior turbinal has the form of a vertical scroll of very thin cartilage, attached by the upper and lower ends of one edge to the ali-ethmoid, but free in the middle; it is rolled upon itself caudad, forming about one turn and a half.

The middle turbinal is attached along the whole length of one vertical edge: from its attachment it passes mesiad, then turns sharply laterad, then curves mesiad again, and passes forwards (upheld) as a broad plate somewhat indented in the middle by a vertical furrow, which gives it, when viewed from the inner face, the appearance of a double fold: this broad plate is attached to the ali-ethmoid all along its vertical edge, and in front is rolled upon itself caudad, forming a scroll of one turn which is attached above and below but free in the middle.

FIG. 6.



The anterior turbinal arises as a single somewhat oblique plate, attached to the ali-ethmoid along its whole length: it soon divides into two plates, each of which becomes rolled upon itself forwards, forming two oblique scrolls.

Finally, the anterior turbinal is continued forwards into the narrow portion of the olfactory chamber (2nd and 3rd portions of lateral ethmoid, see sections), as a horizontal plate, which, like the main portion of the turbinal, divides into two: these are rolled upon them-

selves respectively dorsad and ventrad, forming two horizontal scrolls, which become simpler and simpler, finally being reduced to a single narrow horizontal plate, which is continued as far forwards as a small arterial foramen in the lateral ethmoidal cartilage at the junction of its 3rd and 4th portions.

In addition to these, which may be called the turbinals proper, the 5th anterior (free) portion of the lateral ethmoidal cartilage sends inwards for a short distance a narrow horizontal shelf-like process (fig. 3, sect. 5), beginning immediately caudad of the nostril, and nearly as far back as the junction of the lateral ethmoids with the mesethmoid.

On each side of the ventral edge of the mesethmoid, in the vomerine region is a slender, free rod of cartilage, shaded dark in fig. 2, imbedded in connective tissue, and lying parallel with, and either immediately above or slightly laterad of, the dorsal edge of the vomer. It is about 10 mm. long, and about 0.14 mm. in diameter. This is obviously the vestigial cartilage of Jacobson's organ, figured but not described in "Ostrich Skull" (Plate 10, fig. 14), described in "Skull of Bird," Plate 2 (p. 109, Note): called *upper labial* in Snake (Plate 30, fig. 2), and *nasal floor* in Lizard (Plate 44, figs. 3 and 4).

III. "On Remnants or Vestiges of Amphibian and Reptilian Structures found in the Skull of Birds, both Carinatae and Ratitae." By W. K. PARKER, F.R.S. Received February 9, 1888.

One of the most remarkable structures found in the skull of certain *Amniota* or higher *Vertebrata*—Reptiles and Mammals, is the so-called "Jacobson's organ."

A pair of these curious gland-like bodies, each carefully placed in its own special capsule, may be seen in Serpents, Lizards, and Mammals; but they are not present in Tortoises, Crocodiles or Birds, as far as our present knowledge goes. Rathke, in his work on the Snake's Skull, spoke of the "nasal glands and their capsules," and for a long while this term made them to be confused with the *nasal glands* of birds, which have nothing whatever to do with "Jacobson's organs."

These structures are largest in Serpents, Lizards, and Monotremes, next in order come the Marsupials, Edentates, and Insectivores, then the Mammalia generally, including Man himself, in whom they appear for a time, and then vanish away.*

These structures lie just above the anterior incisive foramina. I

* See Kölliker, 'Ueber die Jacobson'schen Organe des Menschen,' Leipzig, 1877.

FIG. 1.

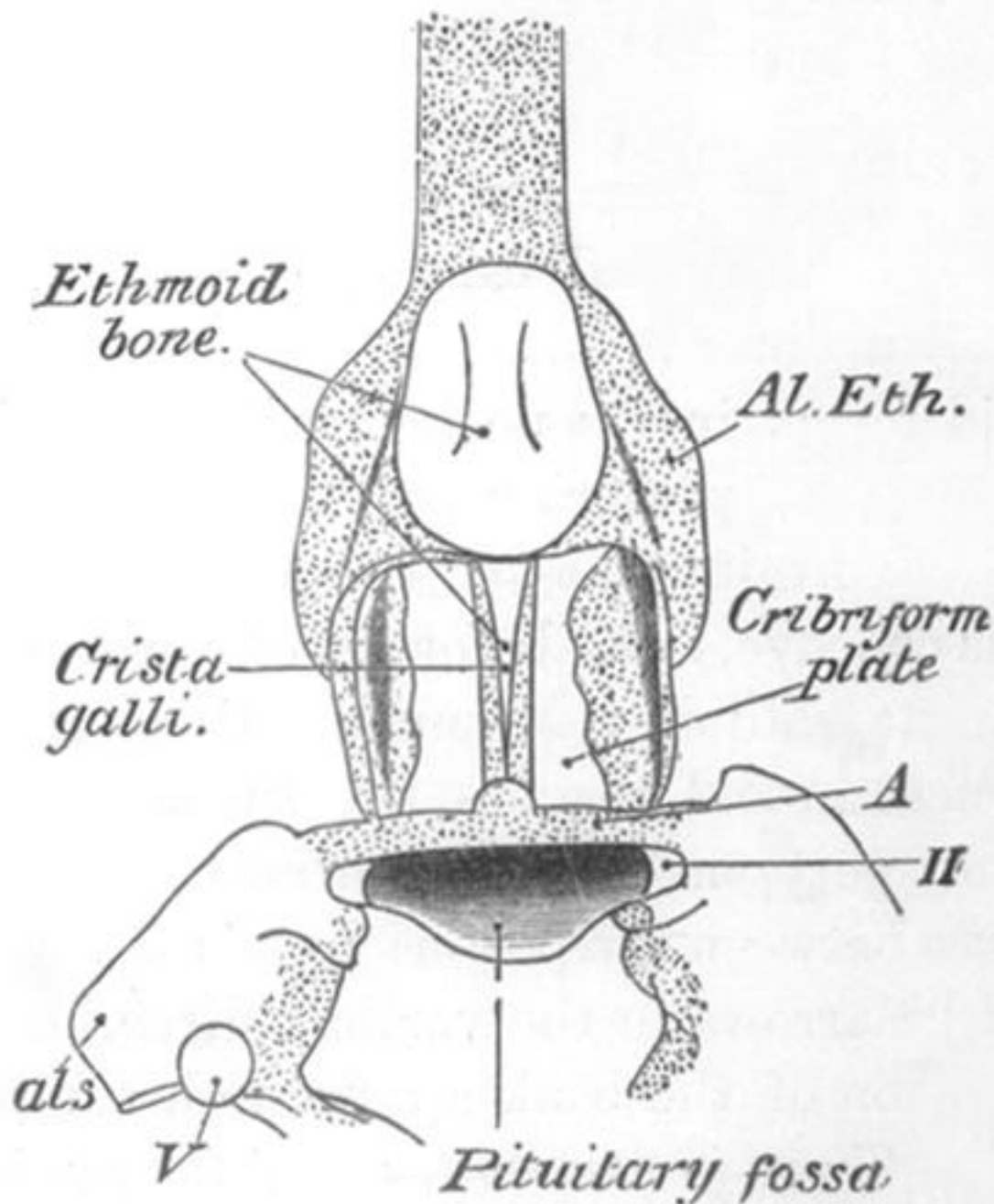
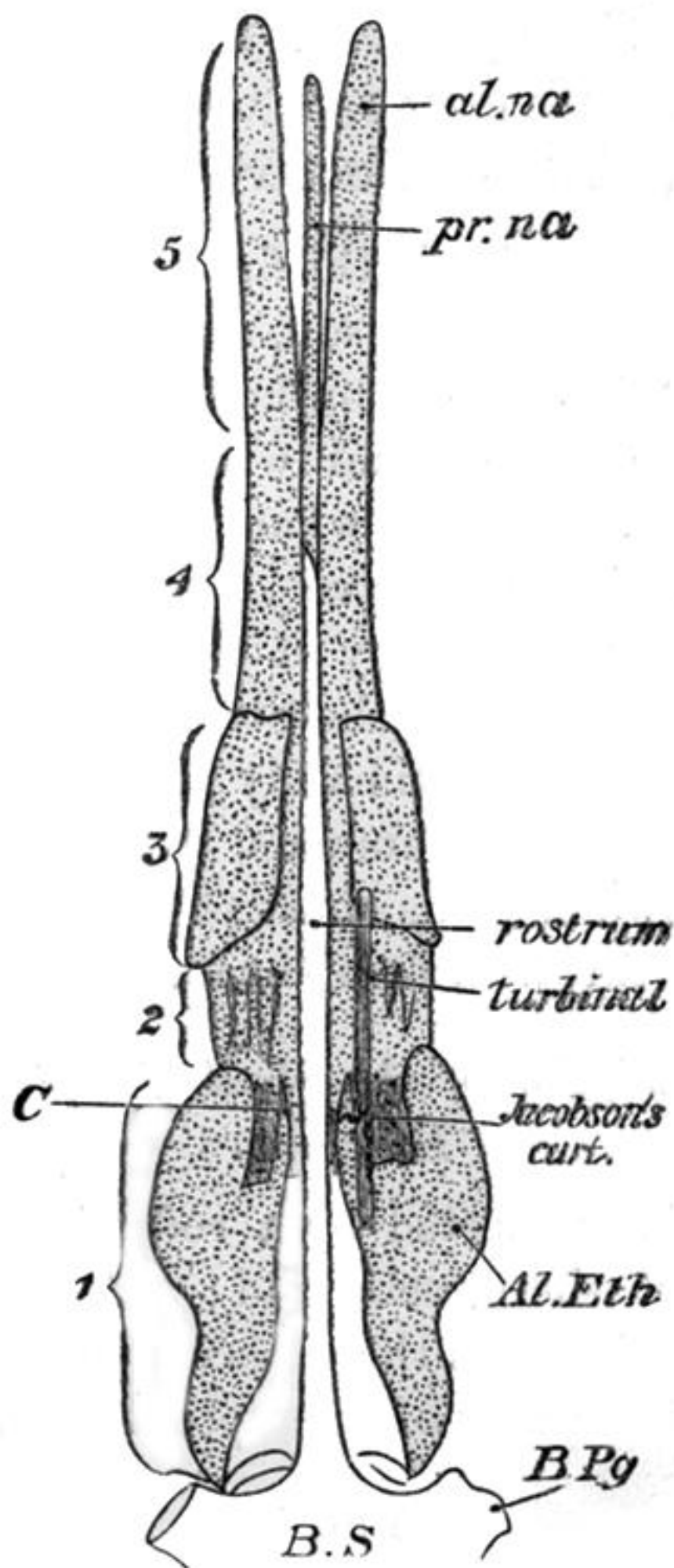


FIG. 2.



Ventral View.

FIG. 3.

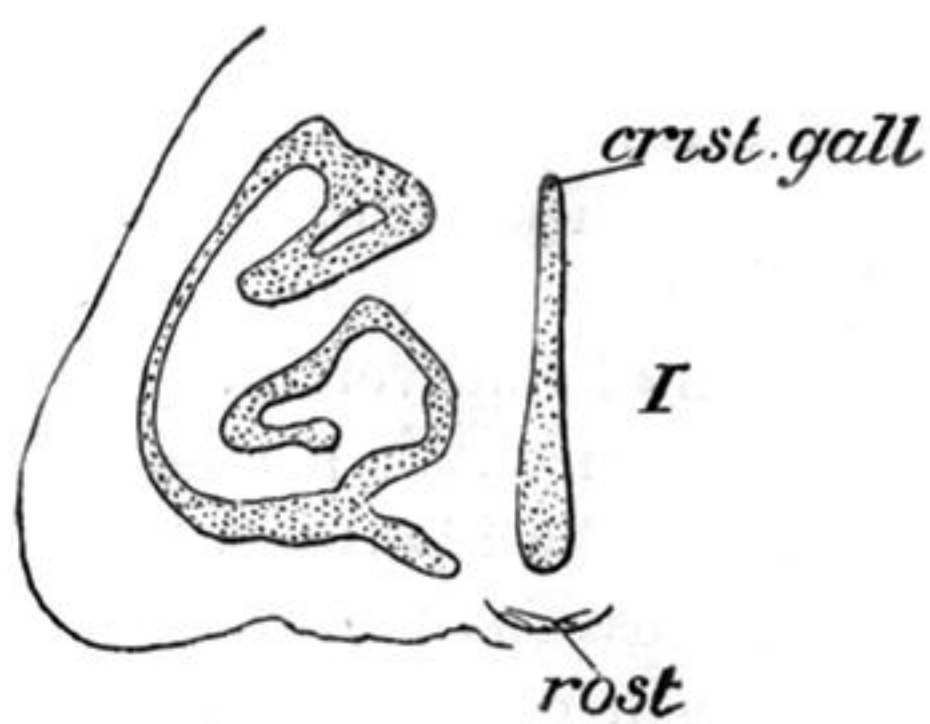
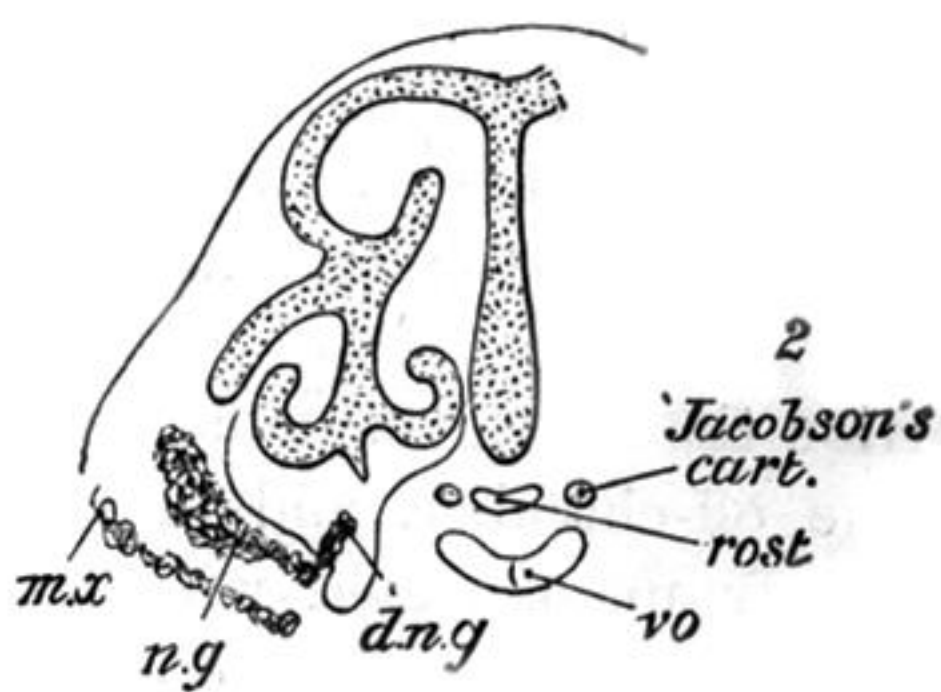
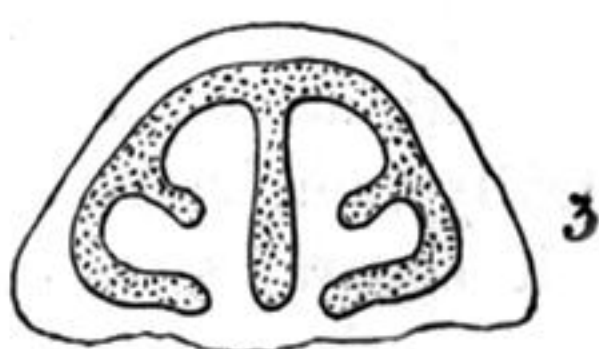
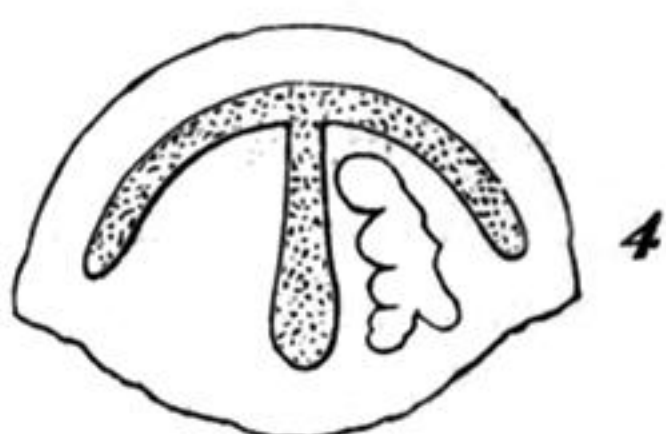
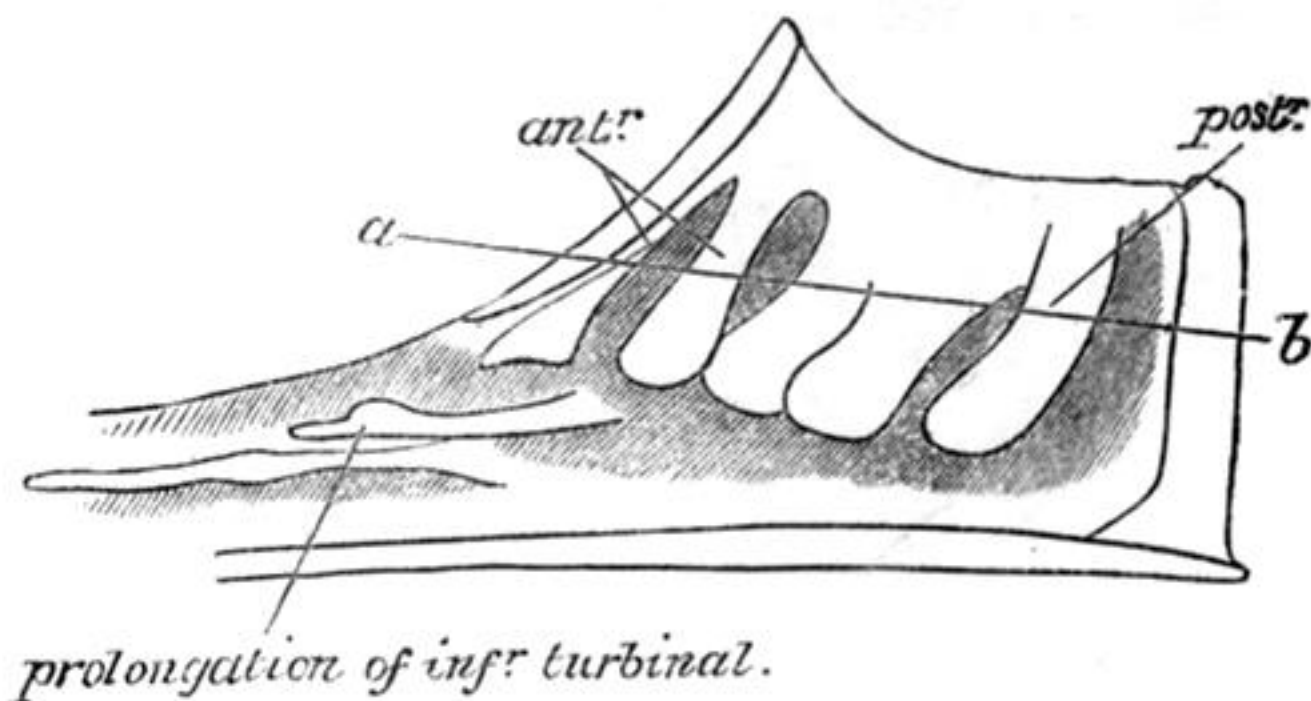
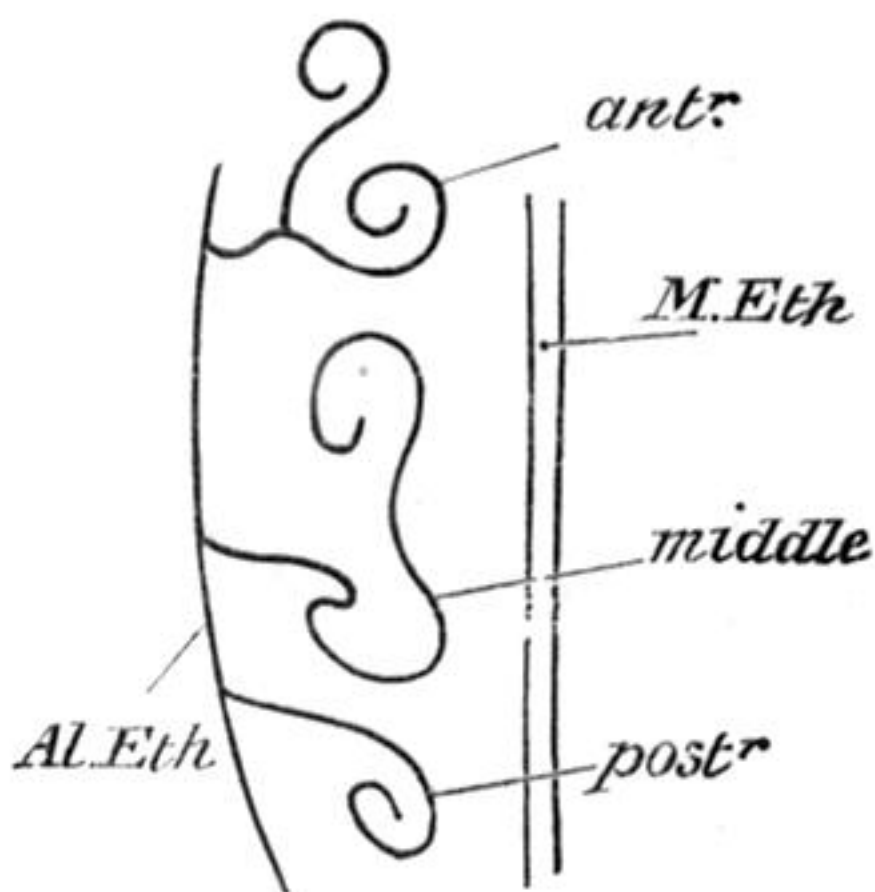


FIG. 4.



Mesial surface of turbinals.

FIG. 5.



Horizontal section along *a*, *b*.